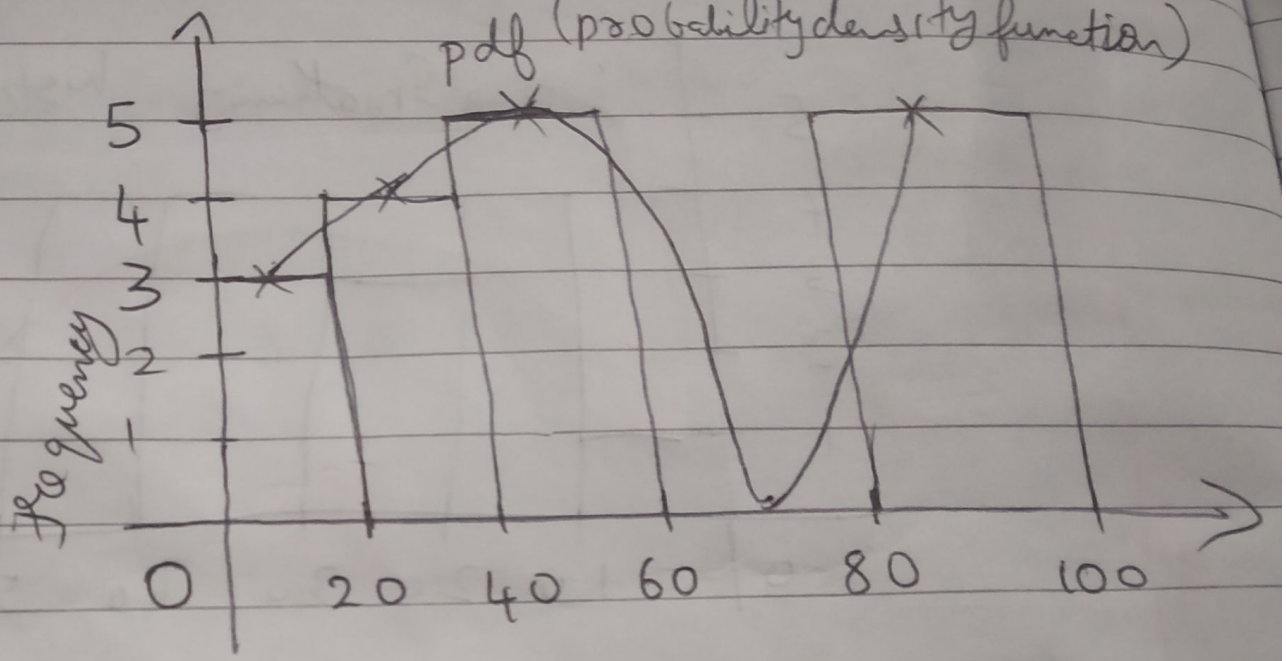
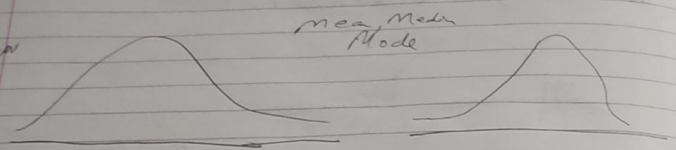
Answer 1


pdf (probability density function)
5
4
3
2
1
frequency
0
20
40
60
80
100

Binomial dist^n
Many Bernoulli experiments together
Tossing a coin 10 times

(4) Interview question



Q3) A car believes that the percentage of citizens in city ABC that owns vehicle is 60% or less. A sales manager ~~believes~~ disagrees with her. He conducted hypothesis testing surveying 250 residents & found that 170 residents responded yes to owning a vehicle.

a) State Null & Alternate hypothesis
b) At 10% significance level, is there enough evidence to support the idea that owned in ABC city is 60% & less

① $H_0: \mu \leq 60\%$ } Null hypothesis
$H_1: \mu > 60\%$ } Alternate hypothesis

$x = 170, n = 250, \quad \alpha = 0.10$

$\hat{p} = \frac{x}{n} = \frac{170}{250} = 0.68$

$p_0 = 0.6$
$q_0 = 1 - p_0 = 1 - 0.6 = 0.4$

② $\alpha = 0.10$

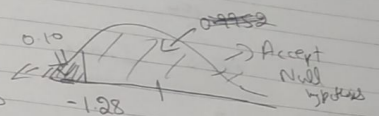
1) $H_0: \mu \leq 60\%$ } Null hypothesis
$H_1: \mu > 60\%$ } Alternate hypothesis

$x = 170, n = 250, \alpha = 0.10, p_0 = 0.6$

$\hat{p} = \frac{x}{n} = \frac{170}{250} = 0.68, \quad q_0 = 1 - p_0 = 1 - 0.6 = 0.4$

2) $\alpha = 0.10$

3) Decision



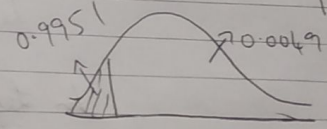
④ Z test with proportion

$Z_{test} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} = \frac{0.08}{\sqrt{0.00096}} = \frac{0.08}{0.0309}$

$= 2.5889$

$2.5889 > -1.28$ & Accept Null hypothesis &

$Z_{calc} = 2.5889$



$1 - 0.9951 = 0.0049$

p-value $= 0.9951$

$0.9951 > 0.10$

p-Value > α Accept Null hypothesis

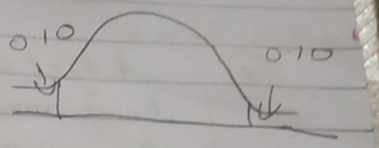
Conclusion: There is enough evidence to support the idea that owned in ABC city

Assignment

Q In Orant test of CAT Exam the population standard deviation is known to be as 100, A sample of 25 test takers has mean of 520 & Construct a 80% C.I. about mean

Ans $\bar{x}$ or $\mu = 520$, C.I $= 80\%$, $\sigma = 100$, $n = 25$

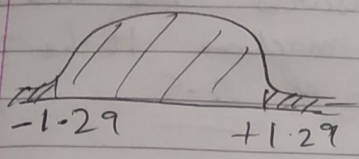
$1 - 0.10 = 0.90$



$$Z_{\frac{\alpha}{2}} = Z_{\frac{0.20}{2}} = 0.10$$

α = Significance value

$\alpha = 1 - 80 = 20$ 0.20



$$\text{Lower Fence} = \bar{x} - Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$

$$= 520 - 1.29 \frac{100}{\sqrt{25}}$$

$$= 520 - 1.29 \times 20$$

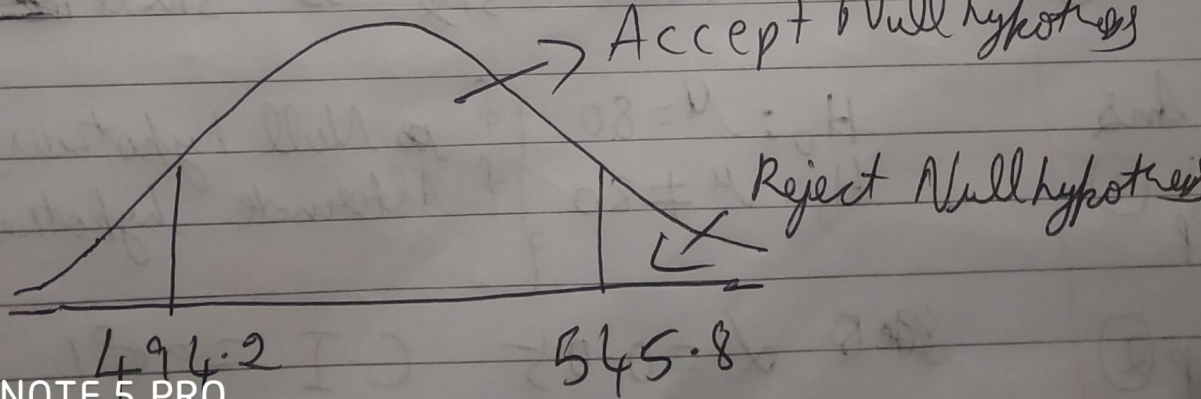
$$= 520 - 25.8$$

$$\text{Lower Fence} = 494.2$$

$$\text{Higher Fence} = \bar{x} + Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$

$$= 520 + 1.29 \times 20$$

$$HF = 545.8$$



4) What is the value of 99 percentile?

2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12

Ans $\text{Value} = \frac{\text{percentile}}{100} \times (n+1)$

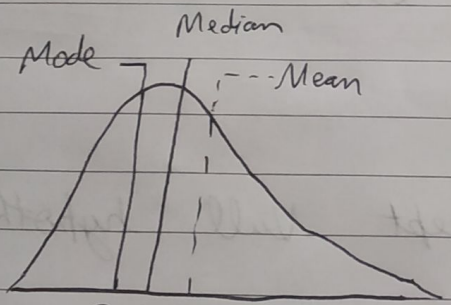
$= \frac{99}{100} (19+1)$

$= \frac{99}{100} \times 20 = \frac{99}{5} = 19.8$

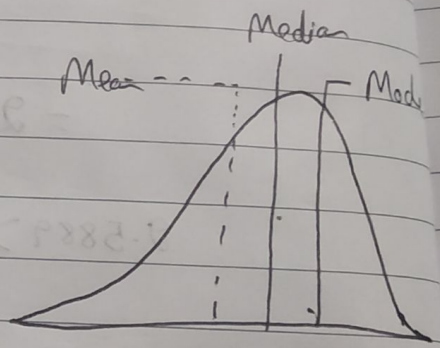
$= 19.8^{th}$ Index

Value = 12

5) In left & right-skewed data, what is the relationship b/w mean, median & mode? Draw graph to represent the same.



Positive Skew of Right-skewed



Negative Skew of Left-skewed

In Right-Skewed the Mean > Median > Mode

In Left-Skewed the Mode > Median > Mean